

**2017-1696**

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In The  
**United States Court Of Appeals  
For The Federal Circuit**

**KOMATSU LTD.,**

*Appellant,*

**v.**

**THE AMERICAN TORCH TIP CO.,**

*Appellee.*

**ON APPEAL FROM THE PATENT AND TRADEMARK OFFICE -  
PATENT TRIAL AND APPEAL BOARD IN REEXAMINATION NO. 95/002,300**

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**BRIEF OF APPELLEE**

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## UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Komatsu Ltd.

v.

The American Torch Tip Co.

Case No. 17-1696

## CERTIFICATE OF INTEREST

Counsel for the:

☐ (petitioner) ☐ (appellant) ☐ (respondent) ☒ (appellee) ☐ (amicus) ☐ (name of party)

The American Torch Tip Co.

certifies the following (use "None" if applicable; use extra sheets if necessary):

1. Full Name of Party Represented by me	2. Name of Real Party in interest (Please only include any real party in interest NOT identified in Question 3) represented by me is:	3. Parent corporations and publicly held companies that own 10 % or more of stock in the party
American Torch Tip Co.	American Torch Tip Co.	None

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court (**and who have not or will not enter an appearance in this case**) are:

Timothy D. Bennett (of Emerson Thomson Bennett, LLC) appeared for appellee before the USPTO but is not expected to appear before this Court.

Mark Rubio (In House Counsel for appellee) appeared for appellee before the USPTO and is expected to appear before this Court as the principal attorney for appellee as soon as admission is granted to this Court's bar.

Mar 14, 2017

Date

/s/ Sergey Vernyuk

Signature of counsel

Please Note: All questions must be answered

Sergey Vernyuk

Printed name of counsel

cc: N/A

Reset Fields

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**STATEMENT OF RELATED CASES**

This case has not been appealed to this Court or to any other appellate court prior to this action. Counsel for Appellee is not aware of any other case that will directly affect or be affected by the decision in this appeal.

## **I. STATEMENT OF THE CASE**

Appellee disagrees with appellant Komatsu, Ltd. (Komatsu) and submits that the Patent Trial and Appeal Board (“PTAB”) met the burden of establishing obviousness with respect to Claims 13, 25, 27, 29, 34, and 50-51 of reexamined U.S. Patent No. 6,320,156 (“the ‘156 patent”). As will be discussed below, the threaded connection of the electrode 30 of prior-art U.S. Patent No. 5,317,126 (“Couch ’126”) was a mechanical connection that could be substituted with the resilient fit connection taught by prior-art U.S. Patent No. 5,308,949 (“Reed”) because it was also a mechanical connection common in the field of plasma torches. The problems of electrical conduction and alignment would have been addressed by a person having ordinary skill in the art (“PHOSITA”) in the design of a threaded electrode as taught by Couch ’126; no additional knowledge would be needed in addressing these issues in a resilient fit electrode. A PHOSITA would have been motivated by the desire to produce an electrode that could quickly be replaced without tools. The PTAB’s finding of obviousness is supported by substantial evidence contained within the record.

### **THE ‘156 PATENT**

The ‘156 patent is directed to a plasma torch and the consumables for use in that plasma torch, where the consumable parts can “be replaced in a simple fashion, whilst avoiding increased complexity in the structure of a plasma torch



and increased costs for same.” Appx69, col. 3, ll. 33-35. Additional objects or goals of the ‘156 patent included, “simplifying the task of installing an electrode,” and “adapting a composition wherein a nozzle and an electrode can be replaced independently.” *Id.* col. 3, ll. 35-45. The ‘156 patent teaches that the electrode 103 has a plurality of elastic tongues 177 that couple the base section 103b of the electrode 103 with the inner sleeve 117 of the main torch unit 101A via frictional resistance generated by the elastic tongues 177. Appx76, col. 17, ll. 13-35.

Independent Claim 13 of the ‘156 patent is directed to an electrode for use in a plasma torch comprising in part the following elements: (1) a cylindrically shaped electrode for coupling detachably with an electrode seating with an electrical contact surface for supplying current, (2) an elastic member that presses against the electrical contact surface of the electrode seating, via elastic force generated by elastic deformation, against the electrical connection surface of the electrode seating, and (3) an electrical connection surface, of the electrode, located on the outer circumference surface of a plurality of tongue-shaped members capable of elastic deformation in the inward direction, wherein the tongue shaped members are located on a skirt section of the electrode which is divided by a plurality of slits. Appx886.

Independent Claim 25 of the ‘156 patent claims similar elements as independent Claim 13 recited above, a plasma torch comprising in part the

following elements: (1) an electrode for coupling detachably with an electrode seating which has an electrical contact surface for supplying current via an electrical connection surface of the electrode located on the outer circumference of the electrode, (2) a plurality of elastic members that press against the electrical contact surface of the electrode seating via elastic force generated by elastic deformation, and (3) the electrical connection surface, of the electrode, located on the outer circumference surface of a plurality of tongue-shaped members capable of elastic deformation in the inward direction, wherein the tongue shaped members are located on a skirt section of the electrode which is divided by a plurality of slits. Claim 25 adds the limitation of requiring the slits that divide the skirt section into a plurality of tongue shaped members defines a part of the cooling water passage so that the electrical connection of the electrode is located in the vicinity of the cooling water passage of the plasma torch. Appx886.

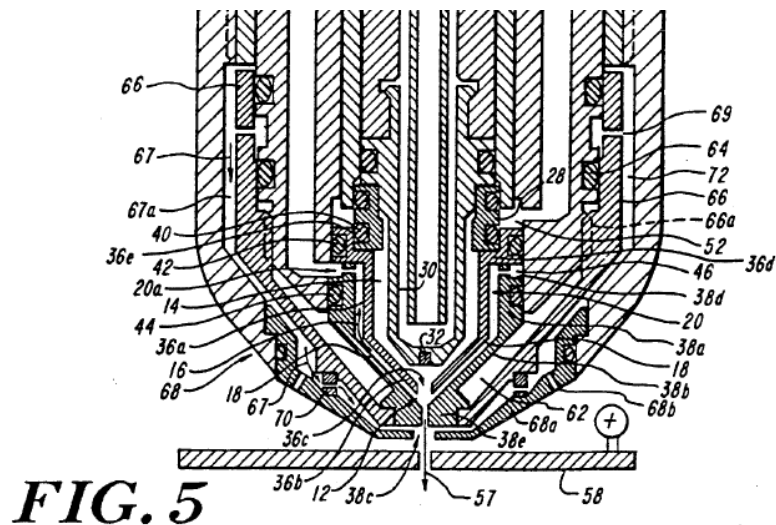
Similarly independent Claim 27 of the '156 patent claims in part a plasma torch comprising the following elements: (1) an electrode for coupling detachably with an electrode seating with an electrical contact surface for supplying current via an electrical connection surface of the electrode located on the outer circumference of the electrode, (2) an elastic member that that presses against the electrical contact surface of the electrode seating via elastic force generated by elastic deformation and (3) the electrical connection surface, of the electrode,

located on the outer circumference surface of a plurality of tongue-shaped members capable of elastic deformation in the inward direction, wherein the tongue shaped members are located on a skirt section of the electrode which is divided by a plurality of slits. Claim 27 adds the limitations requiring the electrode to have an O-ring contacting section on the outer circumference of the electrode that contacts an O-ring interposed between the electrode and the inner diameter of a cylindrical guide, which is pressed by a flange located on the outer circumference of the electrode, where the O-ring contacting section is located between the flange and front end portion of the electrode with respect to an axial direction of the electrode. Appx887.

Independent Claim 50 of the '156 patent claims in part a plasma torch comprising the following elements: (1) an electrode disposed inside of a plasma torch such that it is covered by a nozzle by means of a cylindrical guide, (2) a gap existing between the outer circumference of the electrode and the inner circumference of the cylindrical guide allowing for an O-ring to be inserted there between, (3) the electrode is hollow and internally cooled by water, and (4) the electrical connection surface, of the electrode, located on the outer circumference surface of a plurality of tongue-shaped members capable of elastic deformation in the inward direction, wherein the tongue shaped members are located on a skirt section of the electrode which is divided by a plurality of slits. Appx890.

**U.S. PATENT NO. 5,317,126 (COUCH '126)**

The invention claimed in Couch '126 is directed to nozzle for use in a plasma cutting torch that is designed to work in cooperation with the pre-orifice and electrode to optimize the mass flow velocity to create a virtual nozzle immediately below the electrode. Appx91, col. 3, 32-40. While the claimed invention of Couch '126 is directed to a nozzle for use in a plasma torch, the specification and drawings, *see* Figure 5 of Couch '126 below, disclose an electrode for use in a plasma torch. Couch '126 discloses an electrode 30 that is detachably coupled to a cathode body 24b via a threaded connection which completes an electrical circuit that connects to the negative side of a D.C. (direct current) power supply. Appx92, col. 6, ll. 16-22.

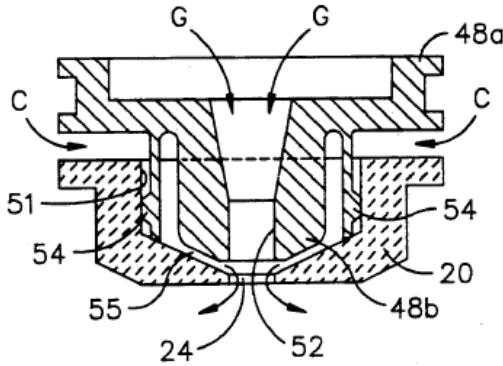


The hafnium insert 32 is press fitted in the lower end face 30c of the electrode 30, the cylindrical portion of the electrode 30 above the hafnium insert 32 is

cylindrical and would act as an O-ring contacting section. Appx91, col. 4, ll. 17-20. The electrode 30 is hollow and the internal diameter is cooled by water supplied via tube 60. Appx92, col. 5, ll. 46-50.

**U.S. PATENT NO. 5,308,949 (REED)**

The invention claimed in Reed discloses an improved nozzle assembly that is economical and allows for the nozzle assembly to be easily disassemble and reassembled to replace components. Appx101, col. 2, ll. 27-34. The nozzle assembly comprises, “a nozzle base 48 is retained in precise alignment in insulator 20 by integral spring means.” Appx102, col. 4, ll. 26-29. The integral spring means is provided by “a plurality of resilient fingers 54 spaced around neck 48b [that] extend into bore a 51 of insulator 20 and provide a radially outward interference fit with the insulator.” *Id.*, col. 4, ll. 30-36. As seen in Figure 7 of Reed below, the ends of the fingers 54 are sized so as to limit the insertion depth of the nozzle base 48 into the insulator 20 so as to create plenum 55. *Id.*, col. 4, ll.36-39.



As stated above, the radial alignment of the nozzle base 48 is provided by resilient finger 54. Reed teaches that the orifices of the nozzle base and insulator must remain concentric at all times. Appx101, col. 1, ll. 47-50.

**U.S. PATENT NO. 3,641,300 (Couch'308)**

Couch '308 teaches a plasma torch that uses a liquid jet to constrict and accelerate the flow of plasma on a workpiece. Appx108, col. 1, ll. 36-39. Couch '308 discloses "a ceramic sleeve 21 which is constructed of an insulating material." Appx108, col. 1, ll. 72-75. Couch '308 is informative as to the level of skill in the part of plasma torches: "[A]s is understood by those skilled in the art, a high-power electric arc discharge between the cathode 15 and the workpiece 13, together with the annular flow of an ionizable gas around the cathode, causes a plasma to be generated which is then projected toward the workpiece." Appx108, col. 2, ll. 57-61.

**U.S. PATENT NO. 5,624,586 (Sobr)**

The invention disclosed in Sobr is a method of aligning the connectors on a plasma torch via alignment pins on the plasma torch. Appx115, col. 2, ll. 3-7. Sobr references Couch '126 as disclosing the general type of nozzle. Appx116, col. 4, ll. 1-3. The electrode 28 of Sobr is “typically formed of copper,” and the arc produced by the electrode 28 and insert 30 of Sobr has a current density of 60,000 amperes/inch<sup>2</sup>. Appx116, col. 3, ll.61-64.

**U.S. PATENT NO. 5,856,647 (Luo)**

The invention disclosed in Luo is a drag cup for use in a plasma torch that is economical to produce and structurally simple, “which is readily mountable on and removable from a torch tip.” Appx125, col. 2, ll. 40-43. Lou teaches that the drag cup is made of a copper alloy, and “the radial thickness of the wall at the juncture between wall portions 130 and 142 is relatively thin, whereby tabs 156 are radially outwardly resilient.” Appx127, col. 6, ll. 7-11. This teaches more than copper being inherently elastic, but also discloses a structure of elastic members.

**SUMMARY OF THE ARGUMENT**

The PTAB properly found independent claims 13, 25, 27, and 50 of the ‘156 patent as obvious under 35 U.S.C. § 103 in view of Couch '126 and Reed. In reaching the determination of obviousness of independent claims 13, 25, 27, and

50 of the '156 patent the PTAB (1) determined the scope and content of the prior art (2) ascertained the differences between the prior art and the claims at issue, (3) did not need to expressly define the level of ordinary skill in the pertinent art because the issue was not argued by Komatsu before the PTAB, and (4) did not need to consider secondary considerations because Komatsu did not present evidence relevant thereto before the PTAB. Substantial evidence supports the PTAB's determination of obviousness of independent claims 13, 25, 27, and 50 of the '156 patent.

The PTAB did not need to articulate the level of skill in the art as Komatsu did not raise the issue prior to this appeal. Furthermore, the prior art reflects the appropriate level of skill in the art of plasma torches. Finally, Komatsu did not show that the outcome would have been different if another level of skill was used by the PTAB.

The '156 patent, Couch '126 and Reed are analogous relating to the field of plasma torches. Substantial evidence shows that the '156 patent and the cited prior art had overlapping objectives. The threaded connection as taught by the electrode of Couch '126 and the resilient fit connection taught by Reed are mechanical connections that are common in the field of plasma torches. The electro-mechanical design considerations of mechanical connections such as threaded connections and resilient fit connections are virtually identical and would



constitute a simple of substitution of known methods by a PHOSITA with predictable results. A PHOSITA would be able to perform the modifications necessary to execute the substitution with an expectation of success.

As will be discussed in detail below, the PTAB's determination of obviousness on grounds 4 and 6 was legally proper.

### **ARGUMENT**

#### **I. THE PTAB PROPERLY CONSIDERED ALL OF THE *GRAHAM* FACTORS AND RELIED ON SUBSTANTIAL EVIDENCE IN SUPPORT OF THE DETERMINATION OF OBVIOUSNESS OF CLAIMS 13, 25, 27, 29, 34, 48, 50 AND 51 OF THE '156 PATENT.**

When determining if a patent is obvious under 35 U.S.C. § 103 this Court uses the framework set out by *Graham*:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

*KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007)(citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)). As will be discussed in greater detail below, the PTAB's determination of obviousness properly considered all of the relevant *Graham* factors.

In the instant case, the PTAB's analysis of the scope and content of the cited prior art relied upon substantial evidence found in the specifications of the cited prior art as well as additional substantial evidence found in the record. The differences between the prior art references cited by the PTAB and the '156 patent were considered and a reason to combine, supported by a rational under pinning, was expressly stated by the PTAB. The issue of the level of skill in the art was not raised by Komatsu before the PTAB and is therefore waived; even if the issue could be raised the level of skill in the art used by PTAB is supported by substantial evidence in the specifications of the cited prior art and record. Komatsu did not offer any evidence of secondary considerations while arguing before the PTAB, therefore that argument is waived.

In *KSR Int'l Co. v. Teleflex Inc.* the Supreme Court outlined the conditions where a simple substitution of a known method is applicable in a determination of obviousness:

[W]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

*KSR*, 550 U.S. at 421.

The PTAB stated that the slip fit method disclosed by Reed and the threads of Couch '126 were common connections in the art. Appx40, ll. 4-8. A PHOSITA would have known that the threaded connection of Couch '126 and resilient fit of Reed were *interchangeable*. Appx40, ll. 8-12. A PHOSITA's desire to solve the design need of an electrode that could be quickly and independently replaced would have guided a PHOSITA to substitute the common connections taught by Couch '126 and Reed. Appx43, ll. 2-8.

**II. THE BOARD PROPERLY ESTABLISHED THE OBVIOUSNESS OF CLAIMS 13, 25, 27, AND 50.**

The PTAB's opinion properly established the obviousness of Claims 13, 25, 27, and 50, and Komatsu's challenges fail for at least the following reasons: (1) the level of skill in the prior art is shown by the prior art and was not contested, (2) the PTAB articulated at least one explicit reason in its analysis as to why a PHOSITA would have combined the teachings of Couch '126 and Reed, (3) the PTAB acknowledged the differences between the teachings of Couch '126 and Reed when determining if it would have been obvious to combine the references, and (4) the cited references disclose all of the elements of Claims 13, 25, 27, and 50.

**A. The PTAB did Not Need to Explicitly Define the Level of Skill in the Art, Nor was the Ultimate Conclusion of Obviousness in Combining Couch '126 and Reed to Obtain the Claimed Elastic Member Influenced by the Level of Skill in the Art.**

There is no reversible error where the PTAB does not explicitly define the level of skill in the art “when ‘the prior art itself reflects an appropriate level and a need for testimony [about the level of skill] is not shown.’” *Genzyme Therapeutic Prod. Ltd. P’ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1371 (Fed. Cir. 2016) (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1354-1355 (Fed. Cir. 2001)).

Additionally, there is no reversible error where the appellant did not show “that the outcome of this case would have been different,” based on which level of skill in the art was used by the PTAB in its analysis. *Id.* at 1372. There was no need for testimony about the level in the skill in the art because Komatsu did not raise the issue of the appropriate level of the skill in the art before the PTAB.

Komatsu did not raise the issue of explicitly defining the level of skill in the art prior to this appeal, thereby waving this argument. By failing to timely raise this issue before the PTAB Komatsu has waived its arguments. *See In re Baxter Int’l, Inc.*, 678 F.3d 1357, 1362 (Fed. Cir. 2012). This Court generally does not considered arguments that were not timely raised before the PTAB. *Id.*

Furthermore, the level of skill in the art is reflected in the prior art. For example, the specifications of Couch ‘126 and Reed clearly demonstrate that a

PHOSITA would be familiar with the mechanical and electrical difficulties in producing a plasma cutting torch. “It is therefore a principal object of the present invention to provide an improved nozzle and method of operation for a plasma arc cutting torch that greatly enhances arc stability, cut quality and the useful life of both the electrode and the nozzle.” Appx90, col. 2, ll. 36-40. “In transferred arc plasma jet cutting equipment, a device, commonly referred to as a 'torch', uses gas flow and heat generated by an electric arc to 'cut' through a metallic workpiece.” Appx101, col. 1, ll. 10-15.

Komatsu appears to suggest that the ultimate determination of obviousness may have been tainted by the PTAB’s failure to define the level of skill in the art, *see* Appellant Brief at 14-17, but Komatsu does not actually state or show that the exact level of skill would have affected the obviousness determination. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654 (Fed. Cir. 2000), cited by Komatsu, is distinguishable from the present facts because the issue of the level of skill was raised in *Ruiz* because of testimony of a witness who claimed to possess “greater than ordinary skill in the art” due to his thirty-year career in the field. 234 F.3d at 667. No such question was raised in the instant case, and the cited prior art references expressly indicate that a PHOSITA would need to be skilled in both the electrical and mechanical issues required in the design of plasma cutting torches

and the consumables (e.g. electrodes and nozzles) for use in plasma cutting torches.

While Komatsu is correct that the PTAB did not make a finding as to “the level of skill of an ordinarily skilled artisan in the field,” the facts of this case are distinguishable from *In re Natural Alternatives, LLC*, 659 Fed. Appx. 608 (Fed. Cir. 2016). In *Natural Alternatives*, the invention at issue used desugared sugar beet molasses (“DSBM”) as the primary ingredient of a deicing composition. 659 Fed. Appx. at 610. In *Natural Alternatives*, one of the prior art references, Zdzislaw, used *sugared* beet molasses with approximately 50% sugar content. *Id.* at 613. In *Natural Alternatives* the PTAB “concluded without evidence that a person of ordinary skill in the art would have ‘optimized’ the amounts of DSBM and road salt to achieve the claimed invention.” *Id.* at 615. In *Natural Alternatives* the PTAB argued that it would be obvious for a PHOSITA to look at a piece of prior art that used virtually the opposite of the main ingredient of claimed invention and proceed to “optimize” the mixture into the claimed invention. *Id.* at 615-616. The question of the level of skill in the art in *Natural Alternatives* pertained to the level of knowledge a PHOSITA would have in sugar beet molasses and DSBM so as to be able to derive the invention of the involved patent from sugared beet molasses of 50% sugar content. In the instant patent, it is simple substitution of two known methods, common in the art, with predicable results.

Komatsu suggests that the PTAB made several “references to the understanding and recognition of a skilled artisan,” but failed to “define[] the level of skill in the art or articulated what knowledge a skilled artisan would have applied to analyze the alignment issues resulting from replacing the threaded connection of Couch ‘126 with the resilient fit of Reed.” Appellant Brief at 16, ll. 15-19. However, as recognized by Komatsu, [t]he PTAB stated:

As the Requester points out (see Resp. Br. Req’r 7) only an ordinary level of skill would have been required to recognize that the resilient fit taught by Reed could be applied to the electrode 30 and cathode body 24b described in Couch ‘126, as opposed to the nozzle body and an insulator described in Reed.

Appx42, ll. 9-13. Additionally, the PTAB noted that “[t]he Patent Owner does not dispute that one of ordinary skill in the art familiar with the teachings of Reed had sufficient skill to fabricate an electrode having resilient fingers.” Appx39 n.3. As discussed above, Komatsu did not raise the issue or present testimony as to the required skill in the art.

By arguing that the PTAB “tried to downplay the level of skill” to “only an ordinary level,” Komatsu seems to suggest that a higher level of skill should apply. Appellant Brief at 15, ll. 19-20 and *id.* at 16, ll. 1-3. “A less sophisticated level of skill generally favors a determination of nonobviousness, and thus the patentee, while a higher level of skill favors the reverse.” *Innovention Toys, LLC v. MGA*

*Entm't, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011). There is no need of reversal here where, the PTAB found that the invention would have been obvious to one having a lower level of skill, because what is obvious to one with a lower level of skill is necessarily obvious to one with a higher level of skill in the field of the invention. *See Id.*

In conclusion, the PTAB did not explicitly define the level of skill in the art because the issue was not raised by Komatsu and because the prior art reflects the appropriate level of skill; nor was there a need for the PTAB to address the issue because Komatsu did not show that the outcome would have been different if another level of skill was used by the PTAB. *See* 825 F.3d at 1371-72.

**B. The PTAB Provided Reasoned Explanations as to Why a PHOSITA Would Combine the Teachings of Couch '126 and Reed.**

The PTAB agreed with the Examiner's finding that Couch '126 taught all the limitations of independent claim 13 of the '156 patent except for the "electrical connection surface being a plurality of elastic tongue-shaped members." *See* Appx39, ll. 13-16. As all other limitations of independent claim 13 were found to be taught by Couch '126, the substitution of the threaded connection of Couch '126 and the resilient fit of Reed is the only combination of the cited prior art at issue. The PTAB stated, "The Examiner correctly finds that a resilient fit effected by inserting resilient fingers extending from one component into a bore in another



component was a type of connection known, if not common, in the pertinent art. Reed teaches this . . . .” Appx40, ll. 3-7. Couch ’126 and Reed contain all the limitations of the claims in question, and motivation to combine can be found in one of the intended purposes of Reed. *See* Appx101, col. 2, ll. 40-43 (“A still further object is to provide a nozzle assembly which can be quickly disassembled or assembled manually by a simple pulling, pushing or twisting motion of the hand.”). “[T]he threaded connection described by Couch ’126 is detachable so as to permit the removal and replacement of spent electrodes.” Appx40, ll. 17-19. The PTAB explicitly stated that a PHOSITA “might have chosen to replace the threaded connection described in Couch ’126 with the resilient fit taught by Reed in order to *secure faster and easier independent replacement of the electrode.*” Appx43 ll. 2-5. The PTAB presented evidence that the only limitation lacking in Couch ’126 was found in Reed, this missing limitation was a common connection in the art of plasma torches where a PHOSITA would have been motivated to combine Couch ’126 and Reed to produce an electrode that could be replaced in an easier method than a threaded electrode.

Komatsu argues that the PTAB did not present a reason *why* a PHOSITA would combine the teachings of Couch ’126 and Reed, citing *Black & Decker, Inc. v. Positec USA, Inc.*, 646 Fed. Appx. 1019 (Fed. Cir. 2016). Appellant Brief at 17, ll. 18-20 and *id.* at 18, ll. 1-2. However, the facts of *Black & Decker* are

distinguishable from the instant case for several reasons. In *Black & Decker*, the cited prior art, Mack and Laverick, did not disclose all of the claimed limitations of disputed claim 7. 646 Fed. Appx. at 1025 (“Mack does not disclose the ‘fixedly secure’ limitation is supported by substantial evidence.”). In *Black & Decker*, “Cross-Appellants offered mere attorney argument to explain why a person of ordinary skill would remove these various structures, including the supporting rib, and instead ‘fixedly secure’ the motor by making Mack’s mounting arrangement ‘beefier.’” *Id.* at 1026. The combination of Mack and Laverick required the removal of supporting ribs, protrusions and surfaces from Laverick and modifying the motor mounting yoke made of spring grade wire to satisfy the “fixedly secure” limitation of claim 7. *Id.* This modification was more than simple substitution of elements already found in the prior art. Additionally, the modification of Mack’s motor mount was against the intended purpose of Mack’s design to “improve on prior art units that had ‘relatively high costs and complex constructions which make assembly, repair and cleaning difficult.’” *Id.* at 1027. The cost and complexity would increase because Mack’s motor mount would have to be replaced with bolts or screws. *Id.* As will be discussed below, the intended purposes of Couch ‘126 and Reed are not frustrated by the combination, and Couch ‘126 and Reed contain all of the elements of at least claims 13, 25, 27, and 50.

The facts of *Black & Decker* are distinguishable from the instant case because Couch '126 and Reed contain all of the elements of at least claims 13, 25, 27, and 50. A reason to combine Couch '126 and Reed is found in the prior art and was explicitly stated by the PTAB and supported by substantial evidence. As discussed above, the PTAB provided reasoned explanation(s) as to *why* a PHOSITA would have combined Couch '126 and Reed.

**C. The PTAB did Not Fail to Address the Differences Between the Objectives of the Cited References and the '156 patent.**

Komatsu's argument regarding the adequacy of the PTAB's consideration of the differences in objectives between the cited prior art and the '156 patent, *see* Appellant Brief at 19-20, seems to be directed at the issue of whether the prior art is analogous to the '156 patent. This Court has stated, "[P]rior art is analogous and can be applied in an obviousness combination if either (1) 'is from the same field of endeavor, regardless of the problem addressed' or (2) 'is reasonably pertinent to the particular problem with which the inventor is involved.'" *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000-1001 (Fed. Cir. 2016)(citing *In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992)). The '156 patent and the cited prior art, specifically Couch '126 and Reed, are all related to the field of plasma cutting torches. Plasma torches produce plasma by passing direct current through the cathode (electrode) to the anode or positive side (nozzle) to complete a pilot arc circuit and transfers the arc to workpiece during operation. Appx101, col. 1, ll. 12-

18 and Appx92, col. 6. ll. 16-25. A PHOSITA would know that any plasma torch that has a nozzle would also have an electrode; a PHOSITA would look at all prior art references dealing with plasma torches and their consumables as analogous art.

As discussed above, the specifications of Couch '126 and Reed contain substantial evidence of the prior art pertaining to the field of plasma cutting torches. Komatsu has admitted that, "the '156 Patent, Couch '126 and Reed are all broadly directed to plasma torches." Appellant Brief at 20, ll. 10-11. There is no dispute as to whether or not the '156 patent, Couch '126 and Reed are analogous art, they are all related to the same field; plasma torches.

As discussed above, Komatsu relies on *Natural Alternatives* as a basis for arguing that the PTAB failed to address the differences between the objectives of the cited references and the '156 patent. Appellant Brief at 19, ll. 7-19. In *Natural Alternatives*, one of cited references, Daly, was directed to a use of DSBM as liquid ballast for filling pneumatic tires. *See* 659 Fed. Appx. at 613. The teachings of Daly were in a disparate technological field and were aimed at solving a substantially different problem. *Id.* at 613-614.

Komatsu argues that the objectives of Couch '126 and Reed are *entirely* different from the '156 patent by stating some of the objectives of the references that are directed specifically to the nozzles disclosed by the respective references. Appellant Brief at 20, ll. 13-17. Komatsu fails to look at the similarities between

the ‘156 patent, Couch ’126 and Reed. Couch ’126 states, “yet a further object is to provide all of the foregoing advantages utilizing known materials and manufacturing techniques and a favorable cost of manufacture.” Appx90, col. 2, ll. 60-63. Reed states, “A further object of the invention is to provide a unique nozzle assembly having individually replaceable components which can be easily assembled within the close tolerances required for optimum cutting performance.” Appx101, col. 2, ll. 35-39. Couch ’126 explicitly states that it wanted to use known manufacturing techniques, which as stated above, the connection taught by Reed was known in the pertinent art. The objectives of the Couch ’126 and Reed clearly overlap with at least one of the objectives of the ‘156 patent, “Therefore, it is an object of the present invention to enable consumable parts to be replaced in a simple fashion, whilst avoiding increased complexity in the structure of a plasma torch and increased costs for same.” Appx69, col. 3, ll. 32-35. Even under the “reasonably pertinent to the particular problem” test for analogous art, *see* 841 F.3d at 1000, Couch ’126 and Reed would be considered analogous art to the ‘156 patent.

The facts of *Natural Alternatives* dealt with prior art references from disparate technological fields and were aimed at solving a substantially different problem than the claimed invention. *See* 659 Fed. Appx. at 613-614. Couch ’126 and Reed are both directed to a consumable for a plasma cutting torch, a

consumable that is part of the pilot arc circuit of a plasma cutting torch. A PHOSITA designing an electrode for use with a plasma cutting torch would be aware of the mechanical and electrical issues related to the operation of a plasma torch, as such the objectives of Couch '126 and Reed would have guided a PHOSITA who was looking for an economical electrode design that could easily be removed and replaced. The PTAB did not fail to establish a prima facie case of obviousness because the objectives of the '156 patent and the cited references overlapped.

**D. The Combined References Teach All the Limitations of Claim 13, Including an Elastic Member that Presses Together Two Electrical Connection Surfaces.**

As stated above, the Examiner found that Couch '126 taught all the limitations of claim 13 except for the “electrical connection surface being a plurality of elastic tongue-shaped members.” *See* Appx39, ll.13-19. The design choice made in Couch '126 was to use a threaded connection as the mechanical connection between the electrode 30 and cathode body 24b. Appx40, ll. 14-16. As stated by the PTAB, “Functionally, there appears to be no dispute that the threaded connection described by Couch '126 is detachable so as to permit the removal and replacement of spent electrodes.” Appx40, ll. 18-20. The resilient fit connection taught by Reed, “can be quickly disassembled and assembled manually by a simple pulling, pushing or twisting motion.” Appx40, ll. 20-23 (citing Reed, col. 2, ll. 40-

43). In both mechanical connections, “a cylindrical bore in one body would have received and aligned a portion of the other body.” Appx41, ll. 24-25. Komatsu acknowledges that, “Reed merely teaches a resilient fit that is used in a mechanical nozzle connection between a nozzle base and an insulator.” Appellant Brief at 22, ll. 1-3.

As discussed above a PHOSITA would have been motivated to substitute the threaded mechanical connection of the electrode of Couch ’126 with the resilient fit mechanical connection of Reed to produce an electrode that could quickly be removed and replaced. By making this substitution the resulting electrode would inherently contain an electrical connection surface being a plurality of elastic tongue-shaped members. For the reasons stated above, the combination of Couch ’126 and Reed teach all of the limitations of claim 13 of the ’156 patent.

### **III. THE PTAB CORRECTLY FOUND THAT IT WOULD HAVE BEEN OBVIOUS TO REPLACE THE THREADED CONNECTION OF COUCH ’126 WITH THE RESILIENT FIT OF REED.**

The PTAB’s finding that it would have been obvious to replace the threaded connection of Couch ’126 with the resilient fit of Reed was proper because: (1) the mechanical connections of the electrode of Couch ’126 and the nozzle base of Reed are interchangeable, (2) the proposed combination of Couch ’126 and Reed was simple substitution of two known mechanical methods for inserting and aligning cylindrical bodies within cylindrical bores, and (3) a PHOSITA would

have had an expectation of success for replacing the threads of Couch '126 with the resilient fit of Reed.

As will be discussed in detail below, the PTAB addressed the reasons why it was obvious to replace the threaded connection of Couch '126 with the resilient fit of Reed.

Although . . . prior art must be considered as a whole and the disadvantages of a reference must be considered in addition to the benefits . . . , there is no requirement that the Board expressly discuss each and every negative and positive piece of **evidence** lurking in the record . . . . [T]his court has said on multiple occasions that failure to explicitly discuss every issue or every piece of **evidence** does not alone establish that the tribunal did not consider it.

*Novartis AG v. Torrent Pharms. Ltd.*, 853 F.3d 1316, 1328 (Fed. Cir. 2017)

(citations omitted) (emphasis added).

**A. The PTAB Presented Substantial Evidence that the Mechanical Connections of the Electrode of Couch '126 and the Nozzle Base of Reed are Interchangeable.**

Komatsu argues that the prior art must teach that the resilient fit of Reed is interchangeable with the threaded connection of Couch '126. Appellant Brief at 23, ll. 10-12. “[t]he mere fact that it is possible to find two isolated disclosures which might be combined in such a way to produce a new compound does not necessarily render such production obvious *unless the art also contains something to suggest the desirability of the proposed combination.*” *In re Grabiak*, 769 F.2d 729, 732 (Fed. Cir. 1985) (emphasis added). As discussed above, a PHOSITA



would have been motivated by the desire to *secure faster and easier independent replacement of the electrode*, which is supported by one of the objectives of Reed (“quickly disassembled or assembled manually by a simple pulling, pushing or twisting motion of the hand”). Appx101, col. 2, ll. 40-43. In the present case the objective of Reed, as described in its specification, presents substantial evidence as to why a PHOSITA would have had a desirable reason to interchange the resilient fit with the threads of Couch ’126. The threaded connection of Couch ’126 is a mechanical connection; it is used in several fields, not just in plasma torches. “These similarities are very general and can be said of any connection between two elements in which one element is detachably retained in a bore of another element and, thus, the supposed similarities are not specific to the elements being connected or even the art of plasma torches.” Appellant Brief at 25, ll. 3-7. Komatsu admits that a threaded connection and resilient fit are commonplace mechanical connections; furthermore this leads to the conclusion that they are interchangeable, as a PHOSITA would absolutely look to commonplace mechanical connections when designing an electrode. The fact that the nozzle base 18 of Reed is made of an insulating material is of no consequence as to the mechanical connection that it teaches. *See Unwired Planet*, 841 F.3d at 1003 (“For the technique’s use to be obvious, the skilled artisan need only be able to recognize...its potential to improve the device and be able to apply the

technique.”). The first time a threaded connection was used on an electrode, a PHOSITA would have known that when two conductive materials are in contact, electrical conduction will take place; the same is true with a resilient fit connection as taught by Reed. “The Court has also instructed that ‘when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield predictable result.’” *In Re Ethicon, Inc.*, 844 F.3d 1344, 1349 (Fed. Cir. 2017)(citing *KSR*, 550 U.S. at 416). The PTAB presented substantial evidence as to *why* a PHOSITA would want to combine Couch ’126 and Reed by substituting the common place mechanical connections taught by each reference and the use of either would yield predictable results.

Komatsu argues that the PTAB “fails to adequately consider the problems of misalignment and increased resistance that would result from the proposed combination.” Appellant Brief at 25, ll. 7-9. Komatsu presents several rudimentary equations dealing with electrical current and resistance that can be found in a University-level Physics text. Even if a PHOSITA *only* had an education in mechanical engineering, he/she would have been required to take and pass a University-level course in Physics. While the Appellee agrees with Komatsu that a PHOSITA should and would know the equation  $R = \rho L / A$ , the equation for the electrical resistance for a length of wire, as plasma torches use

leads consisting of wires to provide electricity to the plasma torch, this would not be of much use in the design of a threaded or resilient fit electrode. Appellant Brief at 25, ll. 12-15. The coefficient “ $\rho$ ” is the resistivity of a material and the inverse,  $\sigma = 1/\rho$ , is the electrical conductivity of a material. *Id.* at 25, ll. 12-13. A PHOSITA would have to be familiar with the coefficients of electrical conductivity and inversely the resistivity of various materials when deciding on what material to make the various conductive components of a plasma torch. As stated above, Komatsu did not dispute that a PHOSITA had the skill to fabricate an electrode with a resilient fit, let alone the level of education of a PHOSITA. Appx39, n.3. Additionally, insulating materials have different levels of resistivity depending on temperature, thickness of the material and the amount of current to be insulated. A PHOSITA would have to be well-practiced in the mechanical and electrical properties of the insulating material used in the design of nozzle base 18 of Reed. As stated above and supported by substantial evidence located within the specifications of Couch ’126 and Reed, a PHOSITA would have to be familiar with both the mechanical and *electrical* issues related to the design of plasma torches.

There are many considerations in thread design that must be taken into account, and in the case of Couch ’126, removability and replaceability are required. Komatsu argues that the surface area of a resilient fit electrode would

have less electrical contact area than a threaded electrode. Appellant Brief at 26, ll. 3-4. However, as explained during the oral arguments before the PTAB, threads do not provide 100% contact between the male and female threaded surfaces; rather, as the threads begin to torque, there is a biasing to one side of the threads as seen in demonstrative Figure 1 below. Appx1021, ll. 12-24, and Appx1022, ll. 1-9.

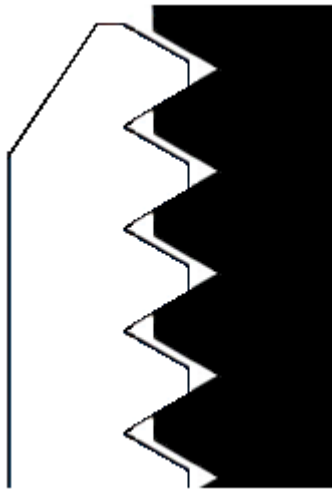


Figure 1

Additionally, other thread design choices can be seen in Figure 1 above that would further reduce the amount of electrical contact area; e.g., the threads have flats machined on the tips of the threads to prevent interference, and the dimensions of the threads are toleranced to allow for a consistent gap to form between the male and female threads, unlike National Pipe thread (“NPT”) threads that are designed to taper together and form an interference fit. Appx1021, ll. 13-21. These design

choices are not stated in Couch '126, but a PHOSITA would have the mechanical and electrical knowledge to adequately design the threaded connection in a threaded electrode. This knowledge would be the required contact area necessary for the electrical current used in the plasma torch, the same knowledge that would be used to size the contact area of a resilient fit as taught by Reed when used in an electrode. Komatsu made, "no representation regarding the degree to which the resilient fit taught by Reed might be inferior." Appx42, ll. 21-22. Even if a resilient fit electrode produces additional heat at the electrical contact surfaces, the internal section of electrode 30 of Couch '126 is liquid-cooled by the coolant that has already cooled the emissive insert 32 of the electrode 30, *see* Appx92, col. 5, ll. 46-50, and the amount of heat that would have to be generated between the contact surfaces of a resilient fit electrode in order to cause melting would be a significant number of orders of magnitude above a threaded electrode. A PHOSITA would have known how to modify an electrode 30 as taught by Couch '126 with resilient "fingers [are] formed in cylindrical shroud 75 by keyhole-like slots 76," as taught by Figure 11b of Reed to at least match, if not exceed, the existing electrical contact area of the threaded electrode 30 of Couch '126. *See* Appx102, col. 4, ll. 61-63.

With regard to the potential increase in misalignment in a resilient fit electrode, as argued by Komatsu, Appellant Brief at 27, ll. 11-17, a PHOSITA

would have modified the electrode 30 and cathode body 24b of Couch '126 to allow for proper alignment when used with a resilient fit electrode. The portion of the cathode body 24b that mates with the electrode 30 of Couch '126 is designed with the mechanical considerations of threading an electrode 30 into the cathode body 24b; there is no reason why a PHOSITA would not modify the length of the electrode 30 and or the cathode body 24b to meet the mechanical and electrical requirements of a resilient fit connection. Komatsu argues, "Reed teaches that it is the gap 55 formed between the nozzle base 18 and the insulator 20, rather than the elastic fingers 54, that ensures proper alignment. Appx102, col. 4, l. 24-42."

Appellant Brief at 27, ll. 15-18. This position is in opposition as to what is disclosed in Reed: "[in] FIGS. 5-7, there is shown an alternate embodiment of the invention in which *a nozzle base 48 is retained in precise alignment in insulator 20 by integral spring means* while maintaining a continuous flow path for coolant C." Appx102, col. 4, ll. 26-30 (emphasis added). Reed expressly states that the nozzle base is kept in alignment by "integral spring means." *Id.* The only integral spring means are the resilient fingers 54: "A plurality of resilient fingers 54 spaced around neck 48b extend into a bore 51 of insulator 20 and provide a *radially outward interference fit with the insulator.*" *Id.*, col. 4, ll. 33-36 (emphasis added). There is a gap 55 produced as follows: "[T]he ends of fingers 54 axially jut beyond neck 48b at its perimeter to limit the insertion depth of nozzle base 48 and form thereby

a plenum 55 between neck section 48b and insulator 20 around the orifices,” the fingers 54 of Reed are sized to create the plenum 55 between the nozzle base 48 and insulator 20 but in no way does Reed state that the gap 55 aligns the nozzle base 48. *Id.*, col. 4, ll. 36-39.

The level of alignment provided by the resilient fit of Reed is not insufficient for use in an electrode. Komatsu argues that the axial length of electrode 30 of Couch '126 is longer than the nozzle base 18 of Reed. Appellant Brief at 28, ll. 1-5. “It is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956 (Fed. Cir. 2000)(citing *In re Wright*, 569 F.2d 1124, 1127 (CCPA 1977)). As the drawings of Couch '126 and Reed are not dimensioned, Komatsu is speculating as to the adequacy of the resilient fit to function at a longer than disclosed length, where no value of length has been presented. Additionally, the resilient fit of Reed is designed such that “the nozzle base is inserted in the insulator with the orifices held in snug ***concentric alignment*** by spring-like fingers extending along the insertion length nozzle base.” Appx102, col. 2, ll. 64-67.

The resilient fit of Reed is capable of providing adequate electrical contact area and is able to maintain ***concentric alignment*** of an electrode that combines

the teachings of Couch '126 and Reed. A PHOSITA would have been familiar with and capable of modifying the electrode 30 and cathode body 24b of Couch '126 to conform with the resilient fit as taught by Reed such that sufficient electrical contact area was maintained and ***concentric alignment*** was maintained with the nozzle and shield orifices. None of the design considerations that a PHOSITA would have needed to account for in the combination of Couch '126 and Reed would have been greater than any other electro-mechanical connection known in the art. “Since *KSR*, we have repeatedly explained that obviousness findings ‘grounded in “common sense” must contain explicit and clear reasoning providing some rational underpinning why common sense compels a finding of obviousness.’” *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017)(citing *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)). Even if the reasoning of the PTAB relied on common sense, there is substantial evidence supporting a rational underpinning why common sense compels a finding of obviousness. For the reasons discussed above, the threaded connection of Couch '126 and resilient fit taught by Reed were properly found to be interchangeable by the PTAB.



**B. The Proposed Combination of Couch '126 and Reed was Simple Substitution of Two Known Mechanical Methods for Inserting and Aligning Cylindrical Bodies within Cylindrical Bores.**

As discussed above, the threaded connection of Couch '126 and the resilient fit connection of Reed are mechanically interchangeable as they are both common mechanical connections for use in attaching a cylindrical item in a bore. While some modification is required to incorporate the resilient fit of Reed into the electrode 30 and cathode body 24b of Couch '126, the modifications are limited to the mechanical and electrical requirements of the resilient fit of Reed. As these connections are interchangeable, a PHOSITA would not consider replacing the resilient fit of Reed with a threaded connection as requiring substantial modification. In both cases, the mating portion of the cathode body 24b would be modified to receive a mating piece in accordance with mechanical and electrical requirements of the connection used. The same would occur in the electrode 30 – a simple substitution of the mechanical connection taking into account the electrical conduction and concentric-alignment requirement of the assembly. In either case, no innovation would be required from the PHOSITA, nor would uncertainty be present that requires undue experimentation.

**C. A PHOSITA Would Have Had an Expectation of Success for Replacing the Threads of Couch '126 with the Resilient Fit of Reed**

The combination of Couch '126 and Reed is the simple substitution of known mechanical methods of connecting a cylindrical item in a bore.

Conventional wisdom favors the interchangeability of the connection methods and supports the argument that a PHOSITA would have inherently known that an electrode 30 and cathode base 24b of Couch '126 modified to use a resilient fit would conduct electricity.

The facts of the instant case are distinguishable from *Murata Mfg. Co.* (which is not binding on this Court). In that case, the prior art stated that multi-stage designs had “significant efficiency losses” when compared to single-stage designs. *See Murata Mfg. Co., Ltd. v. Synqor, Inc.*, Appeal 2012-012209, 2013 Pat. App. LEXIS 5715, at \*22 (PTAB Aug. 16, 2013). In that case, “neither Requester nor the Examiner set forth persuasive evidence that ordinarily skilled artisans contemplated, with a reasonable degree of success producing a multi-stage DC/DC power converter using synchronous rectifiers in its isolation stage prior to the effective filing date of the [reexamined] patent.” *Id.* at 23-24. None of the prior art in the instant case teach away from the combination of Couch '126 and Reed. As discussed above, a PHOSITA would have had an expectation of success with regard to substituting one common mechanical connection with another.

### **CONCLUSION**

For the reasons discussed above, this Court should affirm the PTAB's finding that (1) Claims 13, 25, 27, 29, and 34 of the '156 patent are obvious in view of Couch '126, Sobr, Luo, and Reed; and (2) Claims 50 and 51 of the '156 patent are obvious in view of Couch '126, Couch '308, Sobr, Luo, and Reed.

Respectfully Submitted,

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**CERTIFICATE OF FILING AND SERVICE**

I hereby certify that, on July 10, 2017, I electronically filed the foregoing Brief of Appellant with the Clerk of Court using the CM/ECF System, which will send notice of such filing to all registered users.

I further certify that, upon acceptance and request from the Court, the required paper copies of the foregoing will be deposited with United Parcel Service for delivery to the Clerk, UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT, 717 Madison Place, N.W., Washington, D.C. 20439.

The necessary filing and service were performed in accordance with the instructions given to me by counsel in this case.

Dated: July 10, 2017

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**CERTIFICATE OF COMPLIANCE**

1. This brief complies with the type-volume limitation of Fed. R. App. P. 32(a)(7)(B) because:

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Dated: July 10, 2017

/s/Mark F. Rubio  
Mark F. Rubio

*Counsel for Appellant*